325.551

UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY

FOREST INSECT INVESTIGATIONS

RMO

FOREST INSECT SURVEYS
STANISLAUS NATIONAL FOREST
SEASON OF 1935

by

J. E. Patterson

Berkeley, California

November 19, 1935

Annex 1
SB
763
.C2 S8
1935

U. S. GOVERNMENT PRINTING OFFICE: 1935 J 76133

Forest Insect Laboratory
Berkeley - California
November 19, 1935

FOREST INSECT SURVEYS

STANISLAUS NATIONAL FOREST -

Season of 1935

Approved by:

G. M. Miller

Senior Entomologist, in Charge

Submitted by:

J. E. Patterson

Assistant Entomologist

TABLE OF CONTENTS

Introduction 1

Extent and Type of Survey Made 1

General Infestation Conditions 2

Results of Recent Control Work 3

Infestation Conditions in Unit Areas: 3

- Moss Creek Unit 3
- Anderson Valley Unit 4
- Buck Meadows Unit 4
- Big Creek and Crocker Ridge Unit 5
- South Tuolumne Unit 5
- Jawbone Unit 5
- Pinecrest Unit 5
- Mt. Knight Unit 7
- Calaveras Unit 8
- Stanislaus Unit 8
- Smoothwire Unit 8
- Mokelumne Unit 8

Recommendations 9

Table I

Table II

Map

Photographs

FOREST INSECT SURVEYS - STANISLAUS NATIONAL FOREST

SEASON OF 1935

INTRODUCTION:

The 1935 forest insect reconnaissance of the Stanislaus National Forest was conducted as a joint project with the Forest Service and the Bureau of Entomology and Plant Quarantine cooperating. The field work was accomplished during two separate periods. The first period was from September 22 to September 29. The second included the dates from October 13 to 17 inclusive. During the first period the field crew consisted of B. H. Parsons of the Stanislaus Forest, and J. E. Patterson and J. S. Yuill of the Bureau. Parsons and Patterson worked alone during the second period.

The cost of the survey was born jointly by the cooperating agencies. Salaries and expenses of the members of the field parties were carried by their respective employers. Transportation while on the forest was contributed by the Forest Service.

EXTENT AND TYPE OF SURVEY MADE:

The area covered by the survey included all of the merchantable ponderosa-sugar pine timber suspected of harboring forest insect infestations that are or might become serious within the Forest. The survey area extended from the Merced River on the extreme southern limits of the Forest to its northern boundary on the North fork of the Mokelumne River. It was carried to the fringe type on the west, but was not extended into the alpine and Jeffrey pine stands of the higher elevations on the east. In general, the field work was confined to those stands of known susceptibility to insect infestations of normal or higher proportions, and to those of the fringe type which might contribute infestations to the adjacent better grade stands. Logged areas were excluded with the exception of certain cut-over lands near Pinecrest.

The methods used were of the type of general reconnaissance over a large part of the Forest. The field work was accomplished by traversing the many motor ways now available on this forest. Road counts were made throughout, and the country was viewed from lookouts and other points of good visibility. On other areas where past infestations have been highly epidemic survey methods were more intensive. On such areas previously established sample plots were intensively cruised and all losses recognized and tabulated. The resulting data were used in estimating the total losses on adjoining comparative areas. The survey was sufficiently comprehensive and reliable to ascertain the present status of the barkbeetle infestations in the many distinct areas of this forest and to allow interpretation of the present trends.

GENERAL INFESTATION CONDITIONS:

In general the western pine beetle infestations in the ponderosa pine stands have decreased considerably from the high point reached in 1932-33. This decline is strikingly evident in all the areas with the exception of two local centers at Pinecrest and at Mt. Knight. While relatively high losses have continued on these small local areas they are of little significance in affecting the trend on adjacent extensive areas. It may be stated that the present losses due to this beetle are normal for this forest type.

Infestations of the mountain pine beetle have largely disappeared from the sugar pine stands over the entire forest. A few infested trees were noted in widely separated situations but the infestation as a whole is considerably subnormal.

Flathead bark borers persist in a minor degree in the fringe type forest where they are taking both ponderosa pine and sugar pine trees; but it is evident that this infestation has run its course for the present and has largely disappeared from the better sites.

The present low status of infestations in the marginal type forests found in the Buck Meadows and Calaveras units, is largely due to the comparative absence of these bark borers and the engraver beetles. During the period of the recent epidemic in these areas, which lasted from 1930 to 1935, the flathead borers and engraver beetles constituted the bulk of the infestation and were present in practically every infested tree. With their greatly reduced activity has come the present subnormal infestations on these stands.

The Douglas fir in the South Tuolumne unit is being greatly decimated by the flathead bark borer, Melanophila drummondi. Centers of this infestation are located on Sawmill Mountain and Ascension Mountain and along the middle fork of the Tuolumne River. This infestation first appeared in epidemic form in 1934 and has gained considerable headway since then.

A peculiar type of top-killing of ponderosa pine has made its appearance in two widely separated areas. This type of injury affects the last one to six feet of the terminal and is confined to trees above 20" D.B.H. It is caused by a small Scolytid beetle, Pityophthorus confertus, which works under the bark of the affected part of the stem. No other insects have been found associated with this species in the trees examined. Apparently this top-killing does not result in higher susceptibility of affected trees to other insect attack since many other trees in the infested areas show loss of tips which occurred in previous years though otherwise are now in apparent healthy condition. One center of this infestation occurs on Strawberry Ridge where it is confined to cut-over areas, attacking trees in the reserve stands. The other center is at Smith Meadows, where trees in virgin stands are affected.

RESULTS OF RECENT CONTROL WORK:

The present conditions on the areas where recent control work has been done are in the main gratifying and are what is to be expected following such operations in stands of the west side Sierra type. Control operations were conducted on the South Tuolumne and Buck Meadows areas in 1933-34 and in the Jawbone unit in 1935. The control work on the South Tuolumne unit effected an immediate reduction of 66% in the existing infestation. Subsequent annual losses have shown a further and consistent decline. The result of the control work on the Buck Meadows unit was a reduction of 72% in the first subsequent infestation; and a further reduction of 20% the second year. The immediate result of the control work in the spring of 1935 on the Jawbone unit has been a reduction in beetle losses of 85% throughout the area protected by the operations. Since the present trend of the infestations on these areas is toward further decreased losses we may expect continued benefits derived largely from the control work done in these units.

The three consecutive control projects that have been carried out on the Pinecrest recreational areas during the past three years(1933-34-35) have not, however, been so successful in ridding this area of a persistent infestation in both ponderosa and sugar pine. It is very probable that the failure of these projects is partly due to the abnormal conditions encountered on areas of high recreational use; but in the larger measure it is the result of the control work being confined exclusively to the main recreational area and the leaving of untreated infestations on bordering areas. The individual aspects and situation of this infestation is treated more fully in the discussion of the Pinecrest unit. The recent control operations conducted in the spring of 1935 on the Jawbone unit and the Pinecrest unit have been reported by E. P. Persons in reports dated July 11 and 12, 1935, respectively.

INFESTATION CONDITIONS IN UNIT AREAS:

In Table I is given a summary of plot cruise results, including the figures for the years 1931, 1932, 1933, 1934, and the estimated losses for 1935. Table II gives the estimated losses for the entomological units of the forest in terms of trees and volume per section and per unit. These data are based on plot cruises where available, or in the absence of such data are based on sample plots and road traverses.

MOSS CREEK UNIT: A low normal infestation, caused principally by the western pine beetle, persists in the pine stands on Moss Creek and around Trumbull Peak. This infestation in the aggregate is less than that of the last three years and shows no aggressive tendencies at the present time. It is not in excess of an average of 15 infested trees per section. The present trend is toward further reduction. Control work done in 1933-34 on adjoining Yosemite Park areas to the east has no doubt been influential in accounting for the reduced losses in the unit. Extensive clean logged areas in the unit separate it from any other units of the forest.

ANDERSON VALLEY UNIT: This valley presents an entirely different set of conditions in entire contrast to the other units. These conditions are the result of the severe fire which occurred in the summer of 1934. This fire practically wiped out the entire stand on the floor of the valley and extended with equal severity up the slopes of Grizzly Peak on the south and well up on Pilot Peak and the ridge eastward, both lying north of the valley. The two former B. B. plots were burned to the extent that they are useless in serving as checks for the unit. Estimates for this unit are based on examination of local areas around the burn and counts of recently killed trees in visible sites. Practically all trees within the confines of the burn were killed outright by the fire, rendering them poor breeding material for barkbeetles. Most of these fire-killed trees were attacked by barkbeetles and flathead borers soon after the fire, but due to the abnormal condition of the inner bark, the broods as is usual in these cases, failed to develop which in turn resulted in an actual decrease in number of beetles inhabiting the area. The beetle infestation on the area prior to the fire was of a high normal intensity and was approaching epidemic character. The fact that the present infestation is so relatively low indicates that the fire has resulted in an actual decrease in the beetle population. It is only around the edges of the burn that the infestation is being maintained and this status is evident only on the Pilot Peak slope and along the Mail Box ridge. A plot of 200 acres was examined near Bear Flat. On this plot a total of 13 winter brood trees of the 1934 attacks and 12 summer brood trees of 1935 attack were tallied. Other areas examined showed even lighter infestation. An estimate based on these figures set the present yearly infestation in the unburned stands at near an average of 30 trees per section. There is no infestation at present on the burned area. The infested trees contain mixed broods of the western pine beetle and the California flat head borer. Infestations in this unit are expected to register further decline.

BUCK MEADOWS UNIT: This unit includes the fringe type forest which extends from the Kingsley Ranger Station to the Tuolumne River and includes all of the marginal forest east of Anderson Valley and Pilot Peak ridge. In striking contrast to conditions in 1933 this area is now exceptionally free of insect infestations. The present losses will not exceed 12 infested trees per section throughout the unit. The previous infestations of 1932,-33,-34, consisted mainly of flathead bark borers attacking both ponderosa and sugar pine. This type infestation has practically subsided and the remnant consists of widely scattered attacks of the western pine beetle in ponderosa pine. Since the infestations on this area have already reached the lowest point of which we have any record, it is not expected that a further decline will occur. There is also no indication that the infestation will increase within the next few years. The eastern half of this unit was covered by control work carried out in 1933-34 from the Buck Meadows CCC camp. This portion of the unit is decidedly clean of infestation and reflects the benefits of the control work.

RIO CREEK AND CROCKER RIDGE UNIT: The previous epidemic of the mountain pine beetle in both sugar pine and ponderosa pine which was devastating these stands in 1932 and 1933 has completely subsided. This epidemic resulted partly from logging slash and felled trees which were not removed when logging operations were abruptly terminated in early 1932. The amount of this slash was sufficient to build up the local infestation to epidemic proportions in the surrounding uncut stands. The cycle followed the usual course of infestations resulting from slash and subsided within a period of three years. The present infestation on this unit is composed of the western pine beetle in ponderosa pine. It is normal in character and will not exceed 30 trees per section.

SOUTH TUOLUMNE UNIT: This unit comprises the entire south Tuolumne drainage basin and includes the region between the main Tuolumne River and the Crocker and Pilot Peak ridges. It consists of the whole of the area covered in the Tuolumne control project of 1933-34 and extends eastward to the boundary of the Yosemite Park. Following control work the infestation greatly subsided. This decrease amounted to an immediate reduction of 68% in the infestations throughout the area. Subsequent infestations have registered a further decrease; that of 1935 being only 45% of the 1934 losses. Or conversely, the losses in 1935 had declined 89% from those of 1933; the infestation that was treated in the control work.

The present infestation on this unit averages about 25 trees per section. There are no indications that an increase is imminent.

JAWBONE UNIT: Beetle losses on this unit reached the peak in the summer of 1932 and during the next two years showed very little abatement. Because of the high timber values represented in these stands reduction of these losses was undertaken in the spring of 1935. Following these control operations the beetle losses registered a sharp decline. The immediate effect was a reduction of 85%; the losses in 1935 being only 15% of those in 1934, the last infestation prior to the control work. The present infestation approximates 15 infested trees per section average for the entire unit. This infestation is largely confined to the marginal areas and in trees of the small diameter classes. Certain local areas of this unit have shown high susceptibility to insect attack in the past. These areas, Bull Meadows, lower Granite Creek, Plum Flat, and the lower reaches of the Cherry River, should be closely watched for any increases in the present low infestation.

PINECREST UNIT: Infestations have persisted in this unit despite several recent attempts to eradicate them. These infestations have annually taken a considerable toll in both sugar pine and ponderosa pine and have been especially destructive to the overmature stands on the recreational reserve area and in the scenic strip along the Sonora-Mono road. Many fine specimens of the largest size of both species have been killed each year on the most desirable special use sites. The loss of these trees, if continued, will in time result in such a thinning of these reserved

stands as to defeat the purpose of their reservation. The resultant dead snags will become a hazard of increasing importance to buildings and other improvements. These losses are and have been, caused principally by the mountain pine beetle. The western pine beetle is also responsible for losses in ponderosa pine though to a lesser degree. The reservation is surrounded on two sides by logged lands on which there is a well stocked reserve stand including a high percentage of seed and other classes of large diameter trees. On the other two sides there are virgin stands of mixed pine and fir not highly susceptible to insect attacks. The old, overmature stands on the recreational area are subjected to intensive seasonal usage by campers and semi-permanent residents. Road building and other activities have also contributed to a general abnormal condition in these stands during the periods of greatest insect activity. It is evident that these unusual conditions favor the insects and are responsible for the concentration and continued attacks of barkbeetles. It is possible to show the amount and trends of the annual insect losses in the stands of the recreational area for the past 6 years. These data have been secured through surveys and examinations made annually during this period and are given in the following table:

Year	Number of Trees Per Section	Number of Trees For Area	Estimated loss: Estimated loss for area in BF	Estimated average loss per acre
1930	40	160	211,040	83
1931	105	420	649,380	254
1932	32	128	170,240	66
1933	27	107	270,100	109
1934	22	88	369,600	144
1935	15	60	216,000	84

Control work has been carried out during the last three years of this period; that of 1933 in the late fall, and subsequently during the late spring periods of 1934 and 1935. A considerable portion of the infestation was removed during each of these projects but the work was confined to the main recreational area and to the road screen along the Mono road. Reference to the table will show that while the beetle losses have fluctuated slightly from year to year on the recreational area they have remained too high for the harm in these stands. The fact that these high losses have been maintained despite the control work that has been done, indicates one of two causes, possibly both. The first is the known existence of active infestations on both logged and uncut stands bordering the recreational area which may be contributing reinfestations following cleaning by control work. This is strongly suspected, for it has been observed that the mountain pine beetle is attracted to smoke of which there is ample on this area due to many camps and summer homes. The same species, as well as the western pine beetle, are attracted to fresh slash. Road clearings and other activities have resulted in an amount of such material each season. The second cause is the great abundance of overmature and decadent trees in the reserve stands. Many

such trees are highly attractive to these beetles and offer very little resistance to attack. Others probably die as a result of campers packing the soil around them and the beetles attack while the inner bark is still moist though the trees die from other causes. In either case, these trees would attract beetles and broods would successfully develop in them.

The success of beetle control on this recreational area depends upon the thoroughness of the treatment of the infestations in the reserved stands and also on the thorough removal of infestations in the adjoining forest and logged lands.

The sphere of influence involved in setting up an entomological unit in the artificial control of these infestations is of prime importance to the success of the project. All sources that have a direct bearing on the reinfestation of the cleaned stands must be included in the control work. These outside areas will include the logged lands as far as the type boundary; the reserve screen along the Mono road, and the virgin stands east and south of Strawberry Lake. Such a unit will include about 17 sections or 11,000 acres. About 60% of this area is logged though supporting a well stocked reserve stand. The estimated infestation in the spring of 1936 will approximate 30 trees on the recreational area itself and about 60 trees on the surrounding uncut and logged lands. All of this should be treated. The cost of this amount of control work, based on previous costs of control work in this unit, will average about $12 per tree or $3.50 per M board feet in unit cost, or about $1000 for the entire project. Because of the high altitude and consequent late emergence of broods, the late spring period is the best time for control work in this unit. Advanced fading of infested trees is another factor in favor of spring control work and is of great assistance in spotting infested trees, especially in reserve stands on logged areas where visibility is high. It is highly probable that some control work will be necessary each year on the recreational area following first cleaning of these stands. Such maintenance work could well be confined to the uncut stands on the recreational area and in the road screen. Because of abnormal conditions, consequent upon the intensive use of the area, beetle losses can be kept to a minimum only by continued detection and removal of infested trees. We have on this area conditions analogous to intensively used park areas which requires the same method of insect control and maintenance.

MT. KNIGHT UNIT: A wholly unexpected and unaccounted for infestation has developed in the fringe type forest south and west of this high point. An accumulation of old losses in the form of snags shows a high beetle loss of several years standing in this marginal forest though there has been no recent epidemic immediately preceding the present one. The 1935 epidemic infestation has developed with surprising suddenness and is highly concentrated in groups ranging from 25 to 40 trees each. This infestation is estimated to average 80 trees per section or about

1,700 trees on the 13,000 acres of the unit. Due to the small size of the trees and poor quality the volume represented is low and the value is not great. Control of this infestation at the present time is not recommended. However, the area should be kept under surveillance to detect possible spread of the infestation to other stands of higher value lying eastward.

CALAVERAS UNIT: The southern and western portions of this unit are stocked with the marginal type forests of low grade. The northern and eastern parts contain very high grade stumpage. A considerable portion of the area is privately owned. Scattered logged lands are found throughout. Since much of this cutover land was logged in the early days of the industry there is a sizable reserve stand and a heavy understory of young stock on these old logged areas. Because of these conditions the forest presents a wide variety of aspects. The present infestations throughout this unit is low and has been decreasing for the past three years. This current infestation will average about 20 trees per section, or 940 trees for the entire unit.

STANISLAUS UNIT: There is a virgin forest of high grade stumpage on this unit which comprises an area of 54 sections totaling 34,500 acres. The unit was established in the survey of 1935. Previous to that time nothing was known of insect activity within its borders. That there has been an endemic infestation of several years standing in both ponderosa pine and sugar pine is made evident by the many snags visible throughout the area. This evidence also shows by the even spacing of individual snags that there has not been any grouping of past infestations and that the yearly losses have been normal for these stands. The current infestation will average 32 trees per section or 1,728 trees for the entire unit. No evidence is visible of an upward trend in these losses.

SMOOTHING UNIT: The forests within this unit, like the preceding, have not prior to 1935 been surveyed for insect infestations. The stand in general is somewhat inferior to that of the Stanislaus unit but there are some site II and III stands in the northeast portion. The infestation is endemic and has been of this same character for the past several years. The current beetle loss will average 28 trees per section, aggregating 1,230 for the unit. There are indications that an increase in these losses may soon occur on the poorer sites along the dip of the Middle Fork canyon. It will be advisable to watch these areas in order to detect any such trends.

MOKELUMNE UNIT: This unit comprises the south drainage of the Mokelumne River and its tributaries in Townships 6 and 7 north in range 15 east. The greater portion of this unit supports a stand of site I and II timber of ponderosa pine and sugar pine. The timber values are high though the greater part is privately owned. There has been rather high beetle losses in these stands since 1930, the peak of these infestations culminating in 1931-32. Since then, and until the summer of

1935, the trend has been downward; however, grouping of the infestation in the fall of 1935 may portend an opposite change in this trend and corresponding increased losses. This grouping tendency is highly pronounced in the vicinity of Blue Mountain, Airola Camp, at Bailey, and above Barnett. It is evident that the infestation in this unit is becoming critical and deserves close watching. The current loss is estimated to be 58 trees per section average, which would approximate 3,260 for the unit.

A condition which should be emphasized has developed as a result of falling timber around the Folsom Hill lookout tower. About 50 ponderosa pine trees have been felled in this clearing. An examination in October showed the beginning of a heavy attack by the western pine beetle on this slash. To prevent emergence of these broods and later attacks on adjacent standing trees, this slash should be peeled and the bark burned before late April 1936.

RECOMMENDATIONS:

The recent survey in this forest has revealed conditions in several of the infestation units which should be watched closely. These units are Jawbone, Pinecrest, Mt. Knight, Smoothwire, and Mokelumne. These areas should be re-checked in the fall of 1936. Control of the present infestations is not recommended on any of the units except Pinecrest. Failure of recent control in this unit is considered due to leaving untreated infestations on adjoining uncut areas. It is recommended that these areas be included in the next project which should be carried out in the spring period of 1936. This project should cover an area of about 11,000 acres, involving the treating of approximately 90 infested trees. Trees on this unit run high in board foot volume. Because of high tree volume previous control costs have averaged $12 per tree and $3.50 per M board feet. On this basis the project should cost about $1,000

T A B L E I

PLOT LOSSES - STANISLAUS NATIONAL FOREST

PER SECTION BASIS

Plot Designation	1931 Trees	1931 Volume B.M.	1931 B.M. per Acre	1932 Trees	1932 Volume B.M.	1932 B.M. per Acre	Rel.to 1931 %	1933 Trees	1933 Volume B.M.	1933 BM per Acre	Rel.to 1932 %	1934 Trees	1934 Volume B.M.	1934 BM per Acre	Rel.to 1933 %	1935 (Estimated) Trees	1935 (Estimated) Volume B.M.	1935 (Estimated) BM per Acre	Rel.to 1934 %
Berkeley Hill	80	183,220	286	132	256,260	401	+ 40%	118	194,640	304	-24%	20	48,360	75	-75%	30	84,300	132	+ 76%
R S #14 Aspen Valley	44	95,280	149	184	494,420	772	+418%	96	389,420	608	-21%	48	165,620	259	-57%	20	32,100	50	- 80%
Jawbone	117	198,610	310	136	289,600	452	+ 46%	68	106,040	166	-63%	30	62,650	98	-41%	12	9,500	15	- 85%
Average	80	159,033	248	151	346,760	541	+115%	74	230,033	359	-32%	33	92,213	144	-60%	21	41,966	66	- 54%

T A B L E II

ESTIMATED INSECT LOSSES IN 1935 - PER SECTION AND UNIT

STANISLAUS NATIONAL FOREST

Unit	Timbered Secs.	Timbered Acres	Per Section Trees	Per Section Volume BM	Per Unit Trees	Per Unit Volume BM	Loss per Acre B.M.
1-Moss Creek	12	7,000	15	13,500	165	148,500	22
2-Anderson Valley	14*	8,000*	30	33,000	360	396,000	50
3-Buck Meadows	60	51,200	12	7,900	960	633,600	12
4-Big Creek	12	7,000	30	60,000	330	660,000	95
5-South Tuolumne	52	33,000	25	42,500	1,300	1,210,000	40
6-Jawbone	30	19,200	12	14,400	360	432,000	23
7-Pinecrest	17**	10,800	10	25,000	120	300,000	28
8-Mt. Knight	21	13,400	80	44,800	1,680	940,800	70
9-Calaveras	47	29,000	20	8,000	940	376,000	13
10-Stanislaus	54	34,500	32	35,200	1,728	1,900,800	55
11-Smoothwire	44	28,000	28	35,200	1,230	1,549,600	55
12-Mokelumne	86	55,000	38	79,000	3,260	6,780,800	123
Totals	469	296,100	332	398,800	12,433	15,328,300	566
Total Averages	39	24,675	28	33,233	1,036	1,275,692	52

* Exclusive of severely burned areas

** About 60% of this unit is cut-over

U. S. BUREAU OF ENTOMOLOGY
AND PLANT QUARANTINE

STANISLAUS NATIONAL FOREST

UNITS

1. MOSS CREEK
2. ANDERSON VALLEY
3. BUCK MEADOWS
4. BIG CREEK
5. SOUTH TUOLUMNE
6. JAWBONE
7. PINECREST
8. MT. KNIGHT
9. CALAVERAS
10. STANISLAUS
11. SMOOTHWIRE
12. MOKELUMNE

Two examples of the peculiar top-killing of ponderosa pine caused by Pityophthorus confertus, a small barkbeetle which usually attacks the limbs. This type of injury was found on Strawberry Ridge and at Keith Meadows. The two examples pictured above are reserve trees on a logged area on the former site.

Photo by J. E. Patterson

A large sugar pine tree on Sawmill Mountain dying from attacks by the mountain pine beetle, Dendroctonus monticolae. This barkbeetle has been responsible for extensive losses in the sugar pine stands for the past four years, but has largely disappeared. The tree shown in the picture had been attacked by two successive broods since early spring of 1938 although the lower trunk was still green in September.

Photo by J. E. Patterson

A group of Douglas fir trees killed by the fir flat-head beetle, Melanophila drummondi. Many fir trees on Sawmill Mountain and along the middle fork of the Tuolumne River are dying from attacks of this bark-borer. This infestation first appeared in epidemic form in 1934.

Photo by J. E. Patterson